8.2.1 Affected Environment

This section discusses the historical and existing conditions of agricultural land use, economics and social issues for the five regions that comprise the study area.

8.2.1.1 All Regions

Historical Perspective. *(Insert Overall/Statewide Perspective from Steve Shaffer)*

Existing Conditions

Agricultural Land Use. The Natural Resources Conservation Service (NRCS, formerly Soil Conservation Service) distinguishes among four basic designations of farmland: Prime Farmland, Additional Farmland of Statewide Importance, Unique Farmland, and Additional Farmland of Local Importance. Prime and Additional Farmland of Statewide Importance may currently be used as cropland, pastureland, rangeland, forest land, or other land but not urban built-up land or water.

Prime Farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops, and also is available for these uses. Prime Farmland has the soil quality, growing season, and moisture supply needed to produce sustained high yields or crops economically when treated and managed (including water management) according to modern farming methods.

Additional Farmland of Statewide Importance is land other than Prime Farmland with a good combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and also is available for these uses.

Unique Farmland is land other than Prime and Additional Farmland that currently is used for the production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high-quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are citrus, olives, avocados, fruit, and vegetables.

Additional Farmland of Local Importance is land used for the production of food, feed, forage, fiber, and oilseed crops, even though these lands are not identified as having national or statewide importance. These lands are identified by a local committee made up of concerned agencies that review the lands under this category on at least a 5-year basis.

Table XX shows a summary of 1994 important farmland acreage based on information from the California Department of Conservation (DOC), Farmland Mapping and Monitoring Program. The numbers are estimates of important farmland acreage in the study area regions. It is important to note that several of the counties in the study area have not been completely surveyed by DOC for important farmland and that these summaries have been approximated.

Table 9 identifies approximate acres in agriculture for all five CALFED regions and the percentage of agricultural land in each region.

Agriculture in the five CALFED study regions receives irrigation water from the CVP, the SWP, local water rights and water projects, and groundwater. Most of this water is delivered to farmers through irrigation districts and other water agencies.

Agricultural Water Use and Pricing. Table 5 provides agricultural water use and water pricing in all CALFED regions from 1985 to 1990.

Central Valley Project. The CVP supplies about 30% of total agricultural water use in the study area. Most of CVP water is delivered to the Central Valley counties in the Sacramento River Region and the San Joaquin River Region. CVP water is delivered to approximately 250 water districts, individuals, and companies through

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water service contracts, Sacramento River water rights, and San Joaquin River exchange contracts. The terms "water service contract" and "project water" refer here to water developed by the project and delivered pursuant to repayment and water service contracts. CVP exchange contracts and Sacramento River water rights represent water rights that predate the CVP.

remove

Deliveries under water rights and exchange water contracts can be reduced in a critical year only, and these contractors must be notified of any shortages by February 15 of each year. (Reclamation defines a critical year as one in which the forecast inflow into Shasta Lake is less than or equal to 3.2 million acre-feet, or a critical year can also be declared based on shortage in the current and previous year.)

remove

CVP's San Felipe Division (SFD) delivers project water to parts of Santa Clara and San Benito counties. The total SFD deliveries averaged about 35,000 acre-feet in recent years. The CVP also makes releases from storage for instream flows, Delta water quality, and other obligations that affect agriculture. CVP power production and flood protection are a benefit to agriculture.

State Water Project. The SWP supplies about 10% of total agricultural water use in the CALFED study area. Through contracts with 29 water agencies, the SWP provides water within the Central Valley to Butte, Solano, Kings, and Kern counties; outside the Central Valley to several Southern California counties; to Alameda and Santa Clara counties in the South Bay Area; and to Napa and Solano counties in the North Bay Area. In addition, the SWP provides water rights deliveries to water rights holders along the Feather River (Butte and Plumas counties).

Local surface water. Local surface water supplies (those not delivered by either project) provide about 40% of all agricultural water supplies in the study area. More local surface water supplies are available on the east side of the valley because of the larger amount of precipitation in the Sierra Nevada. Locally owned water projects are especially important on the Yuba, Stanislaus, Tuolumne, Kings, and Merced rivers; but local sources on the west side like the federal Solano Project also are important.

Groundwater. Groundwater provides a significant supply of water for agriculture in normal years, and it is often used to reduce or eliminate shortages of surface water supplies during drought. On average, groundwater provides about 20% of total agricultural water use in the study area.

Declining groundwater tables, subsidence, and loss of aquifer storage continue to be costly problems, particularly in the western and southern parts of the San Joaquin River Region and the Bay Region, where less surface water is available. Declining groundwater tables increase pumping costs. The costs of subsidence include damage to structures, failure of well casings, and frequent surveying. Water from the CVP and SWP had replaced some of the groundwater pumping, and withdrawals were about equal to estimated recharge (Bertoldi et al. 1991). However, the recent drought and supply restrictions imposed by the CVPIA of 1992, the Bay-Delta Accord, and Biological Opinions have reduced surface water supplies and renewed the past trend of groundwater depletion throughout the valley.

remove ?

#3 Physical

(Insert Discussion ~~of Wildlife Benefits from~~ Ag. Lands)

For more discussion of Agricultural Habitats for Wildlife and wintering Waterfowl ~~please~~ see Section 3.2.1

#8 Socioeconomic

~~Agricultural Economics.~~ The CALFED study area represents an important agricultural region for both California and the United States. California is the most diversified agricultural economy in the world, producing more than 250 crop and livestock commodities. The study area encompasses 85 % of the total California irrigated land, covering 39 of the 58 counties in California. In 1995, the 39 counties together contributed about 95% of California's agricultural production value and represented

Move Intact to Top

nine of the top 10 agricultural counties in California and seven of the top 10 counties in the nation. Agriculture in the study area is also an important employer and affects the regional economy through the expenditures of farmers and the processing and transportation of crops harvested.

The study area accounts for almost all of the U.S. production of many fruit and nut crops, such as almonds, pistachios, walnuts, nectarines, plums and prunes, dates, figs, kiwi fruit, and olives. The study area jointly produces about 15% of the total U.S. market value of crop production, 55% of the nation's fruits and nuts, 20% of our cotton, and 55% of U.S. vegetables (Census 1994). California also has been the nation's leading agricultural export state. The total of $11.72 billion export in 1995 represented 20% of total U.S. agricultural exports (CDFA 1997).

Table 6 shows irrigated acres and production value in all CALFED regions from 1986 to 1995. Table 7 includes the number of farms, farm sizes, and farm ownership in all CALFED regions for 1987 and 1992. Table 8 contains farm income and production expense in all CALFED regions for 1987 and 1992.

Social Well-Being Related to Agriculture. To describe the affected environment for social well being, this document relies on the grouping of counties for each region shown as follows in Table 10. This grouping is necessary in order to aggregate racial, income and population data from the U. S. Census.

The affected environment for social well being involves both community stability issues and environmental justice issues. Although community stability and environmental justice issues overlap in many respects (for example, income and poverty levels) they are discussed separately for organizational purposes. Additionally, community stability is described for the entire study area rather than on a regional basis.

CALFED Regions	Counties
Delta Region	98% of Contra Costa, 45% of Sacramento, 46% of San Joaquin, 30% of Solano, and 20% of Yolo counties.
Bay Region	Alameda, 2% of Contra Costa, Marin, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz and Sonoma.
Sacramento River Region	Butte, Colusa, Glenn, Placer, 55% of Sacramento, Shasta, 70% of Solano, Sutter, Tehama, 80% of Yolo, and Yuba.
San Joaquin River Region	Fresno, Kern, King, Madera, Merced, 54% of San Joaquin, Stanislaus, and Tulare.
SWP and CVP Service Area Outside Central Valley	Imperial, Los Angeles, Plumas, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura.

Table 10. CALFED Regions and Groupings of Counties

Community Stability. The affected environment for community stability includes the following:

- Social groups in the CALFED study area,
- Economic indicators of social well being,
- Employment opportunities, and
- Community social structure.

Several important social groups are related to agriculture in the study area: farmers, farm workers, and agribusiness.

Economic indicators of social well being include population demographics, median family income, per capita income, poverty rates, and unemployment rates. These indicators are summarized by region in Table 11.

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	Delta Region	Bay Region	Sacramento River Region	San Joaquin River Region	CVP and SWP Service Areas Outside the Central Valley
Population (1996)	2,362, 514	5,498,964	1,666,650	3,004,222	19,159,450
Economic Indicators					
Median family income (1989)	40,690	46,373	31,794	30,862	38,825
Per capita income (1994)	21,991	28,079	18,313	16,475	20,358
Poverty rate	11%	9%	13%	18%	13%
Unemployment rate (1995)					
Average	7.8%	6.6%	11.2%	13.3%	10%
Range	5.8 to 12.3%	4.3 to 13.5%	6.1 to 19.7%%	8.2 to 16.9%	5.1 to 28.8%

NOTE:

California Department of Finance 1993, aggregated into CALFED region as shown in Table 10.

Table 11. Regional Demographics and Economic Indicators of Social Well Being for All Regions

This section summarizes regional economic indicators of social well being in the study area as they apply to all social groups and communities. Some general conclusions derived from review of the economic data presented in Table 11 are as follows:

- In the study area, people living in predominantly rural areas have lower incomes, higher poverty rates, and higher unemployment rates than those living in the urban regions. However, San Francisco and Los Angeles counties experience high income levels and some of the highest poverty rates in the state.

- In all regions (except the Sacramento River Region) pockets of prosperity have an "averaging effect" of raising average personal income levels and lowering average poverty and unemployment rates, as shown in Table 11.

Personal income is measured as family and/or per capita income, as shown in Table 11. Median family income is a measure of the annual income received by families living together in the same household. The median is a statistical term for the midpoint of a data set. There is a wide range of median family income in the study area. Per capita income in the study area ranges from $10,000 in the Tulare Lake area and Yuba County (Sacramento River Region) to $28,000 in Marin County in the Bay Region.

There is a wide range of poverty rates within the study area. The highest poverty rates in the study area occur in predominantly rural areas,

and poverty rates are higher among minority ethnic groups. A 1986 study by the EDD (Ong et al. 1986) estimated the poverty rates among races in California during 1980, as summarized in Table 12.

Ethnicity	Poverty Rate (Percentage)
White	6
Black	21
Hispanic	18
Asian and other	11

Table 12. Poverty Rate by Ethnicity

As shown in Table 11, existing unemployment rates are lowest in the Bay and Delta regions where more employment opportunities are available. Unemployment rates are presented as a range in areas with diverse economies such as the urban and agricultural areas in the Sacramento Valley and San Joaquin Valley.

Unemployment rates in the study area are higher among minority ethnic groups. The EDD (Ong et al. 1986) estimated statewide unemployment rates among races in California during 1980, as summarized in Table 13.

Ethnicity	Unemployment Rate (percentage)
White	4
Black	7
Hispanic	7
Asian and other	4

Table 13. Unemployment Rate by Ethnicity

Employment opportunities vary within the study area regions. Urban centers offer the greatest employment opportunities for all skill levels. Employment opportunities exist in a greater number of industrial sectors than those found in the rural portions of the study area, thus providing a better employment base. Employment opportunities in rural areas involve predominant industries, such as agriculture, logging, and fishing. When economic downturns or other influencing factors occur that affect these predominant industries, workers have limited opportunities for finding new work. Changes in employment opportunities are important economic indicators of social well being. Employment opportunities generally increase as worker education and technical skill levels increase. However, agricultural employment has been available for less technically skilled workers. Agricultural production for many crops requires trained workers for pruning, thinning, sorting, and harvesting.

seems unnecessary remove?

Average annual agricultural employment was about 400,000 to 435,000 jobs from 1987 to 1992. Approximately 420,000 people were employed in the agriculture industry in 1992 (EDD 1993). The relationship between the agricultural sector and the larger economy of the Central Valley is important in assessment of social factors. Agricultural employment is becoming a less significant factor in measuring the viability of the local economy in all areas of the Central Valley than it once was historically. The economy of the Central Valley has grown and diversified, and non-agricultural employment opportunities are increasing. This general trend does not hold true for some communities. Agriculture remains the dominant industry and economic force in many smaller communities.

2 - remove

Factors affecting social well being include not only employment opportunities but also job guarantees. Job guarantees are affected by seasonal employment trends and economic trends and, in some cases, natural occurrences. Seasonal employment affects agricultural workers. Economic trends also may affect

agriculture. Natural occurrences such as weather conditions can shorten or lengthen seasonal employment opportunities. For example, water shortages can reduce the number of acres farmed. Natural occurrences such as drought and flood conditions and economic conditions are not under the control of CALFED and, although they are not addressed further in this chapter, are important to consider in the assessment of existing conditions.

For the CALFED study area, the largest sectors of workers who may be affected are seasonal farm workers and agricultural workers. Seasonal unemployment among farm workers and agricultural workers usually occurs during winter months following harvest and summer vacation periods. Changes in seasonal employment can affect the demand for social services. The demand for social services increases during periods of unemployment, such as requests for unemployment payments, health services, and other family support programs. The need to utilize family, health, and income support services can decrease social well being among persons who are employed during much of the year but are seasonally unemployed.

Regional social programs are administered by county and city governments. Funding for these programs may be available from the federal government, state government, or local agencies or interest groups.

Counties provide support through a variety of services. Services administered through county offices include worker education and training programs, job placement services, aid for families and children, and welfare programs.

Cities provide public protection services and health services to residents. Employment and job training programs are not administered by cities, except under special circumstances in which a city may promote economic development and employment opportunities, or provide funding to other local agencies for worker placement.

School districts can sponsor worker education programs such as English as a second language or basic technical skills. School districts generally are considered to provide education for grades 1 through 12. However, local community colleges also assist workers by improving education and labor skills. The local Private Industry Councils and Employment Opportunities Commissions can work with schools to provide worker training.

Schools also can provide after-school child care and subsidized meals to assist working families and disadvantaged children. In areas with low family income, these programs can be valuable.

Local communities provide a social base for people to access assistance and support during times of need. The social structure of a community may provide job training, educational opportunities, family support services, religious and cultural outlets for support and counseling, recreational opportunities, and monetary assistance. These services may be available through community or county agencies or from cultural and religious institutions within the community. The local community also provides an identifying factor for all residents and a sense of belonging. When economic changes occur within an area, such as the loss or gain of a major employer or drought or flood conditions, the local community can be affected significantly.

This is especially true if the local economy is centered around one industry type, such as agriculture. The community is a crucial level of social organization. It is at this level that most social services are delivered, social networks formed, and values and beliefs confirmed.

Environmental Justice. The analysis of potential environmental justice issues focuses on the farm worker population. Within the population potentially affected by the CALFED program, this population is the most racially diverse. Table 14 indicates ethnicity by region, and Table 15 presents the racial distribution of farm workers by region.

for all of these sections, it seems all of the 1st sentences of the ¶'s could be combined, remove the rest, & then make 1 ¶

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Region	Ethnicity (percentage)			
	White	Black	Asian	Hispanic
Delta Region	68	8	9	14
Bay Region	61	8	15	16
Sacramento River Region	82	4	5	10
San Joaquin River Region	62	4	6	30
SWP and CVP Service Areas Outside the Central Valley	52	9	9	30

SOURCE:
California Department of Finance 1993

Table 14. Ethnicity by Region

The vast majority of U.S. farm workers have been Mexican immigrants and their children since the Bracero Program, which operated from 1942 to 1964 , brought in more than 4 million laborers from Mexico. Earlier decades saw substantial numbers of Chinese, Japanese, Filipinos, and Native and African Americans. By 1983, an estimated 90% of the seasonal farm laborers in California were Mexicans or Chicanos, while nationwide the figure was 60%. Most migrant farm workers are either American citizens or are working in the country legally. The Department of Labor estimates that about 25% of migrant farm workers are illegal immigrants.

Additionally, the Department of Labor estimates that at any given time, 12% (or at least 190,000) domestic farm workers are out of work nationwide. The majority of farm workers earn annual wages of less than $7,500. Although wage rates for farm workers have increased over the last decade, when they are adjusted for inflation,

Region	Hispanic	White	Black	American Indian/Eskimo Aleutian	Asian Pacific/ Islander	Total Number of Farm Workers

Delta	77%	15.1%	0.8%	0.3%	6.5%	5,470
Bay	82.2%	14.4%	1%	0%	2.2%	12,230
Sacramento River	58.9%	30.9%	0.4%	1%	8.2%	11,560
San Joaquin River	84%	11.9%	0.3%	0.2%	3.4%	74,220
SWP and CVP Service Areas Outside the Central Valley	86.9%	10.1%	.9%	.2%	1.7%	44,960
Totals	**122,490**	**19,500**	**840**	**400**	**4,860**	**148,440**

SOURCE:
1990 Census of Population and Housing.

Table 15. Racial Distribution of Farm Workers by Region

farm workers' real wages have decreased 15 to 25% in that time. (USDA 1991.)

8.2.1.2 Delta Region

Historical Perspective. Agriculture in the Delta Region began in the mid-1800s, consisting primarily of dryland farming or irrigated agriculture from artesian wells, groundwater pumping, and creek side diversions. Extensive Delta development began in late 1850, when the Federal Swamp Land Act promoted converting swamp and overflow lands to agricultural production. During the early 1900s, a series of levees and human-made waterways were developed to enhance future agricultural and urban development. Between 1920 and 1950, irrigated agriculture development increased rapidly from 2.7 million acres to over 4.7 million acres for the entire Central Valley.

Between 1944 and 1964, the number of farms in the region increased from 3,457 in 1944 to 4,502 in 1949, and then declined to 3,374 in 1964. The decline was due mainly to the accumulation of irrigated land into fewer and larger farms. As a result, the average farm size in the Delta Region increased from 58 acres in 1944 to 132 acres in 1964.

Between 1976 and 1993, the total amount of agricultural land in the legal Delta was reduced by about 14,500 acres, almost all of which occurred in the Delta Secondary Zone. **This was largely due to conversion of agricultural land to urban uses in the Brentwood and Oakley areas of Contra Costa County, the Pocket area in Sacramento County, the West Sacramento area in Yolo County, and the Stockton and Tracy areas in San Joaquin County.**

Existing Conditions

Agricultural Land Use. Today, of the more than 700,000 acres in the legal Delta, about 500,000 acres are rich farmland . Most of this area is classified as prime farmland, unique farmland, locally important farmland, or as having high statewide significance for agricultural production. The Delta's rich peat and mineral soils support several types of agriculture (DWR 1993b).

(This really seems out of place)

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turn this into a text box to reference to Ch. 6

Peat Soil Loss. One of the unique problems with organic/peat soil is that when it is exposed to aerobic conditions by farm cultivation it oxidizes and erodes away. This has led to a drop in land surface elevations several feet below sea level throughout much of the Delta from historical levels at or above sea level. For a more thorough discussion of this unique problem see the Geology and Soils section in Chapter 6.

OK

Agricultural Water Use and Pricing. Most agricultural water users in the Delta are private water right holders. Local water rights water accounts for over 85% of the total irrigation water use. Other irrigation water sources in the Delta Region are CVP water and groundwater, each accounting for about five to ten percent of the total agricultural water uses. Between 1985 and 1990, compared with other parts of California, the cost of water was much cheaper in the Delta Region because of large amounts of local riparian and pre-1914 appropriate water rights.

Keep header

Farm Profiles. Numbers and sizes of farms, together with ownership patterns, describe the general structure of agriculture within a region. A large number of farms can mean larger economic influences within the region in terms of employment, spending, and taxes. Ownership patterns can give an indication of the numbers of farm owners and managers who live within a region. Labor expenses are important to workers and the communities in which they live.

Remove

The number of farms decreased from 4,033 in 1987 to 3,639 in 1992 in the Delta Region, partly due to loss of farm land (62,000 acres) to industrial and urban uses, and partly to the accumulation of farm land into fewer and larger farms. The average farm size increased from 238 acres to 247 acres during this period. About 70% of farms in the Delta are operated by full owners.

Agricultural Economics. ***(Insert Delta Region Discussion)***

This does seem out of place. Can it go in the historical perspective section?

Cropping Patterns and Production Value. Field crops dominate Delta crop production, accounting for 30% of the region's total harvested acres. The next important group of crops in the region include alfalfa, grains, and orchards, each accounting for ten to 15% of the total crop acreage. Orchards and grapes together accounted for less than 20% of the total harvest acreage in the Delta between 1986 and 1995, but produced about 50% of the total production value, reflecting high crop values per acre. Alfalfa and field crops produced about 15% of total production value, with more than 40% of total harvested acres, indicating lower crop values per acre.

Keep Header

Agricultural Production Costs and Revenues. Agricultural net returns are revenues less costs. Higher costs reduce farm profits, but some part of costs also represent farm expenditures in the regional economy. Revenues are unit price multiplied by the level of production.

remove

Farms in the Delta Region achieved $496 million in agricultural sales in 1987 and $590 million in 1992, as shown in **Table 8.2.1-1**. Production expenses were about $474 million in 1992, leaving a net cash return of $126 million. Hired and contract labor was the largest expense reported, accounting for 25% of total expenses.

Keep Header

Social Well-being Related to Agriculture. Social well-being is a measure of community standards and attitudes or contentment. High levels of employment, income, and opportunities for satisfaction, such as cultural or recreation opportunities, generally contribute to high levels of social well-being. In contrast, high levels of unemployment and poverty and few opportunities for satisfaction can contribute to lower feelings of contentment and social well-being. These attitudes may be reflected in the community by higher crime rates, increased alcoholism or other dependencies, and other adverse social conditions.

OK to remove

As shown in **Table 8.2.1-2**, the 1996 total population for the Delta Region was 2,362,514. The median family income was $40,690 (1989), per capita income was $21,991 (1994), poverty

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rate was 11 percent (1990), and the unemployment rate ranged from 5.8 to 12.3 percent (1995).

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Region	Year	Total Farm Income (million dollars)				Total Production Expenses (million dollars)				Net Cash Return (million dollars)
		Agric. Product Value	Other Revenue	Total	Livestock Related	Fertilizers and Chemicals	Hired and Contract Labor	Other	Total	
Delta	1987	496	12	508	81	38	97	169	385	123
	1992	590	10	600	89	48	128	209	474	126
Bay	1987	845	2	847	102	36	255	281	674	173
	1992	1,065	6	1,071	105	53	338	335	831	240
Sacramento River	1987	1,515	145	1,660	126	140	252	525	1,043	617
	1992	1,394	183	1,577	147	180	316	630	1,273	304
San Joaquin River	1987	6,565	222	6,787	1,276	531	1,337	2,197	5,341	1,446
	1992	8,089	308	8397	1,780	670	1,691	2,736	6,877	1,520
SWP and CVP Service Areas	1987	3,743	30	3,773	872	185	842	1,044	2,943	830
	1992	4,295	29	4,324	904	222	1,072	1,312	3,510	814

SOURCES:
Census 1989, 1994.

Table 8.2.1-1 Farm Income and Production Expense in All Regions, 1987 and 1992

Table 8.2.1-2

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8.2.1.3 Bay Region

Historical Perspective. Between 1944 and 1964, the number of farms increased from 5,581 in 1944 to 6,146 in 1954 in the Bay Region, then declined to 4,103 in 1964. This was partly due to the accumulation of irrigated land into fewer and larger farms and urban encroachment. Between 1946 and 1950, orchards were by far the most important crop in the Bay Region, accounting for 47% of the total irrigated acres.

Existing Conditions
(Fix this discussion - there must be some current conditions on land use . . .)
Agricultural Land Use. Prior to the 1940s, land uses in the Bay Region were principally urban in the city of San Francisco and rural in other portions of the region. Over the last 50 years, however, land uses throughout the Region have become progressively more urbanized.

Agricultural Water Use and Pricing. Over 75% of irrigation water sources in the Bay Region are from groundwater pumping. Local water and project water make up the other 25%. Groundwater extractions commonly exceed groundwater replenishment, therefore, many of the region's aquifers are experiencing overdraft conditions (DWR 1994).

Between 1985 and 1990, the average cost of surface water in this region is estimated at $15 to $45 per acre-foot, which is about the average in California. The cost of groundwater in the Bay Region is much higher ($60 to $130 per acre-foot) compared with the Delta and Sacramento River regions.

Farm Profiles. The number of farms decreased from 8,377 in 1987 to 7,453 in 1992 in the Bay Region, partly due to loss of farm land (54,000 acres) to industrial and urban uses, and partly to the accumulation of farm land into fewer and larger farms. The average farm size increased from 276 acres to 303 acres during this period. About 70% of farms in the Bay Region are operated by full owners.

Cropping Patterns and Production Value. Grapes are the dominant crop in the Bay Region, accounting for 30% of the region's total harvested acres. The next important group of crops in the region is sugar beets and truck crops, each accounting for about 20% of the total crop acreage. Between 1986 and 1995, grapes and orchards together accounted for less than 50% of the total harvest acreage, but produced about 80% of the total production value, reflecting high crop values per acre. Alfalfa, grains, and field crops produced about 2% of total production value, with more than 35% of total harvested acres.

Agricultural Production Costs and Revenues. Farms in the Bay Region achieved $845 million in agricultural sales in 1987 and $1,065 million in 1992, as shown in Table 8.2.1-1. Production expenses were about $831 million in 1992, leaving a net cash return of $240 million. Hired and contract labor was the largest expense reported, accounting for about 40% of total expenses, and it has been increasing over time.

Social Well-being Related to Agriculture. As shown in **Table 8.2.1-2**, the 1996 total population for the Bay Region was 5,498,964. The median family income was $46,373 (1989), per capita income was $28,079 (1994), poverty rate was 9 percent (1990), and the unemployment rate ranged from 4.3 to 13.5 percent (1995).

8.2.1.4 Sacramento River Region

Historical Perspective. Between 1944 and 1964, the number of farms increased from 9,948 in 1944 to 11,538 in 1954 in the Sacramento River Region, then declined to 9,255 in 1964. This was mainly due to the accumulation of irrigated land into fewer and larger farms. As a result, the average farm size in the region increased from 64 acres in 1944 to 138 acres in 1964.

Rice was the most important crop in the Sacramento River Region, accounting for 30% of the total irrigated acres. Almost 90% of

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California rice crops were grown in this region during the 1946-1950 period. The next important crops in the Sacramento River Region were irrigated pasture and orchards, each accounting for 20% of the total irrigated acres.

Existing Conditions

Agricultural Land Use. Land uses in the Sacramento River Region are principally agricultural and open space, with urban development focused in the city of Sacramento. More than half the region's population lives in the greater metropolitan Sacramento area. Other fast-growing communities include Vacaville, Dixon, Redding, Chico, and various Sierra Nevada foothill towns. Urban development has occurred along major highway corridors in Placer, El Dorado, Yolo, Solano, and Sutter counties, and has taken some irrigated agricultural land out of production. Suburban ranchette homes on relatively large parcels surround many of the urban areas, and often include irrigated pastures or small orchards.

The region supports about 2,145,000 acres of irrigated agriculture. About 1,847,000 acres are irrigated on the valley floor; the surrounding mountain valleys within the region add about 298,000 irrigated acres (primarily pasture and alfalfa) to the region's total.

[insert prime/unique discussion]

Agricultural Water Use and Pricing. About 40% of irrigation water sources in the Sacramento River Region are from local water rights or local water projects. CVP project water and groundwater each makes up the rest of the total agricultural water uses. The 30% of the region's lands that are irrigated with groundwater generally have a very reliable supply.

The majority of diverters along the Sacramento and Feather Rivers existed before major CVP and SWP reservoirs were built. Between 1985 and 1990, the average cost of surface water in this region is estimated at $0 to $15 per acre-foot, among the lowest in California. The cost of groundwater is estimated at $30 to $60 per acre-foot, also among the lowest in the state.

Farm Profiles. The number of farms decreased from 11,916 in 1987 to 11,507 in 1992 in the Sacramento River Region, primarily due to loss of farm land (193,000 acres) to industrial and urban uses. The average farm size remained about the same during this period. About 70% of farms are operated by full owners.

Cropping Patterns and Production Value. Rice is the number one crop in the Sacramento River Region, accounting for 26% of the region's total harvested acres. The next important group of crops in the region includes field crops (19%), orchards (15%), pasture (11%), and grains (10%). Between 1986 and 1995, orchards and tomatoes together accounted for less than 25% of the total harvest acreage in this region, but produced about 50% of the total production value, reflecting high crop values per acre. Pasture, alfalfa, grains, and field crops produced less than 20% of total production value, with more than 50% of total harvested acres, indicating lower crop values per acre.

Due to extensive re-use of water in the Central Valley, significant savings only occur from fallowing or through crop shifts. Decreased reliability constrains the conversion to high-value crops because of increased risk, particularly when groundwater is unavailable or of low quality. More lower-value but drought tolerant crops are planted instead.

Agricultural Production Costs and Revenues. Farms in the Sacramento River Region achieved $1,515 million in agricultural sales in 1987 and $1,349 million in 1992, as shown in **Table 8.2.1-1**. Production expenses were about $630 million in 1992, leaving a net cash return of $304 million. Hired and contract labor was the largest expense reported, accounting for about 25% of total expenses.

Social Well-being Related to Agriculture. As shown in **Table 8.2.1-2**, the 1996 total population for the Sacramento River Region was 1,666,650. The median family income was $31,794 (1989), per capita income was $18,313 (1994), poverty

rate was 13 percent, and the unemployment rate ranged from 6.1 to 19.7 percent (1995).

8.2.1.5 San Joaquin River Region

Historical Perspective. Between 1944 and 1964, the number of farms increased from 30,212 in 1944 to 33,832 in 1949 in the San Joaquin River Region, then declined to 25,153 in 1964. This was mainly due to the accumulation of irrigated land into fewer and larger farms. As a result, the average farm size in the region increased from 78 acres in 1944 to 155 acres in 1964.

Between 1946 and 1950, in terms of irrigated acres, cotton and grains were the most important crops in the San Joaquin River Region, accounting for 22% and 20% of the total irrigated acres, respectively. The next important crops in the San Joaquin River Region were irrigated pasture, alfalfa and grapes, each accounting for about 15% of the total irrigated acres. Almost 100% of California cotton and 90% of California grapes were grown in this region during the 1964-1950 period.

Prior to the 1960s, land uses in the San Joaquin River Region were principally agriculture and open space, with urban uses limited to small farm communities. Although agriculture and food processing are still the region's major industries, expansion from the San Francisco Bay Area and Sacramento over the past 30 years has resulted in the creation of major urban centers throughout the region.

Existing Conditions

Agricultural Land Use. Land uses in the San Joaquin River Region are predominantly open space in the mountain and foothill areas, and agricultural in the San Joaquin Valley area. Urban land use in 1990 totaled 295,300 acres. Urban areas include the cities of Stockton, Modesto, Merced, and Tracy, as well as smaller communities such as Lodi, Galt, Madera, and Manteca. The western side of the region, south of Tracy, is sparsely populated. Small farming communities provide services for farms and ranches in the area, all relatively close to Interstate 5.

insert prime & unique discussion

Agricultural Water Use and Pricing. About 40% of irrigation water sources in the San Joaquin River Region are from local water rights or local water projects. CVP project water provides 35% of total irrigation water uses, mostly to the Westlands Water District. The rest of the region's water is from the SWP and groundwater pumping.

Between 1985 and 1990, the average cost of surface water in this region is estimated at $20 to $85 per acre-foot, among the high end in California. The cost of groundwater is estimated at $30 to $80 per acre-foot, also among the high end in the state.

Farm Profiles. The number of farms in the San Joaquin River Region decreased from 28,742 in 1987 to 26,731 in 1992, partly due to loss of farm land (439,000 acres) to industrial and urban uses, and partly due to the accumulation of farm land into fewer and larger farms. The average farm size increased from 351 acres to 361 acres during this period. About 73% of farms are operated by full owners.

Cropping Patterns and Production Value. In terms of harvested acres, cotton is the number one crop in the San Joaquin River Region, accounting for 25% of the region's total harvested acres. The next important crops in the region are field crops (15%), orchards (13%), grapes (10%), and alfalfa (10%). Between 1986 and 1995, grapes and orchards together accounted for less than 25% of the total harvest acreage in this region but produced about 50% of the total production value. Pasture, alfalfa, grains, and field crops produced less than 20% of total production value with more than 50% of total harvested acres.

Agricultural Production Costs and Revenues. Farms in the San Joaquin River Region achieved $6,565 million in agricultural sales in 1987 and $8,089 million in 1992, as shown in **Table 8.2.1-1**. Production expenses were about $2,736 million

in 1992, leaving a net cash return of $1,520 million. Hired and contract labor was the largest expense reported, accounting for about 25% of total expenses.

Social Well-being Related to Agriculture. As shown in **Table 8.2.1-2**, the 1996 total population for the San Joaquin Region was 3,004,222. The median family income was $30,862 (1989), per capita income was $16,475 (1994), poverty rate was 18 percent (1990), and the unemployment rate ranged from 8.2 to 16.9 percent (1995).

8.2.1.6 SWP and CVP Service Areas

Historical Perspective. Between 1944 and 1964 in the SWP and CVP Service Areas Outside the Central Valley, the number of farms decreased from 33,715 in 1944 to 13,603 in 1964, mainly due to the accumulation of irrigated land into fewer and larger farms. As a result, the average farm size in the region increased from 30 acres in 1944 to 82 acres in 1964.

Between 1946 and 1950, in terms of irrigated acres, alfalfa and subtropical orchards were the most important crops in the region, accounting for 24% and 22% of the total irrigated acres, respectively. The next important crops in the region were truck crops, field crops, and grains, each accounting for about 15 to 20% of the total irrigated acres. Other crops grown in the region included pasture and orchards. Over 90% of California subtropical orchards were grown in this region during the 1964 to 1950 period. Development in the region has steadily increased since the 1880s.

Existing Conditions

Agricultural Land Use. About 15% (377,500 acres) of the region's land is estimated to comprise agricultural land uses. Intensive agriculture is in the Santa Maria and lower Santa Ynez valleys; moderate levels of agricultural activity also occur near the South Coast area. Agricultural crops include grapes, vegetables, and truck crops, as well as a thriving flower seed industry. Total irrigated land in the area was about 145,000 acres in 1990.

The South Coast is the most urbanized region in all of California. Irrigated cropland accounts for about 288,000 acres of the region. The largest amount of irrigated agriculture is in Ventura County, where about 116,600 acres of cropland are cultivated, including vegetables, strawberries, citrus, and avocados.

Moderate levels of irrigated agriculture subsist in the Mojave River, Antelope, and Indian Wells valleys. Most of the acreage produces alfalfa, pasture, or deciduous fruit. About one-half (30,000 acres) of the entire region's irrigated crop land is estimated to lie in the SWP and CVP Service Areas Outside the Central Valley.

Prominent agricultural crops in the southern portion of San Bernardino County, the middle portion of Riverside County, and the Salton Sea in Imperial County include alfalfa, winter vegetables, melons, grapes, dates, and wheat, located primarily in the Coachella Valley area.

Agricultural Water Use and Pricing. Outside the Central Valley, SWP water and groundwater each provides 40% of total irrigation water in the region. Local water provides the rest of total irrigation water uses.

Between 1985 and 1990, the average cost of surface water in this region is estimated at $15 to $255 per acre-foot, among the highest in California. The cost of groundwater is estimated at $80 to $120 per acre-foot, also among the highest in the state.

Farm Profiles. The number of farms in the region decreased from 21,281 in 1987 to 19,899 in 1992, primarily due to loss of farm land (791,000 acres) to industrial and urban uses. The average farm size decreased from 295 acres to 276 acres during this period. About 80% of farms in this region.

Cropping Patterns and Production Value. In terms of harvested acres, alfalfa is the number one crop

in the region, accounting for 28% of the region's total harvested acres. The next important crops in the region are pasture (12%), subtropical orchards (11%), field crops (10%), and grains (10%). Between 1986 and 1995, truck crops and orchards together accounted for less than 30% of the total harvest acreage in this region but produced about 70% of the total production value. Pasture, alfalfa, grains, and field crops produced less than 15% of total production value with more than 50% of total harvested acres.

Agricultural Production Costs and Revenues. Farms in the SWP and CVP Service Areas Outside the Central Valley achieved $3,743 million in agricultural sales in 1987 and $4,295 million in 1992, as shown in **Table 8.2.1-1**. Production expenses were about $3,510 million in 1992, leaving a net cash return of $814 million. Hired and contract labor was the largest expense reported, accounting for about 30% of total expenses.

Social Well-being Related to Agriculture. As shown in **Table 8.2.1-2**, the 1996 total population for the CVP and SWP Service Areas was 19,159,450. The median family income was $38,825 (1989), per capita income was $20,358 (1994), poverty rate was 13 percent, and the unemployment rate ranged from 5.1 to 28.8 percent (1995).

8.2.2 Environmental Consequences: ~~Land Use~~ Physical Env.

(Put this paragraph in a text box . . .) There is additional information related to land use in the next section on "Economics." The information is noted there to help the reader better understand economics effects of the Program.

8.2.2.1 Assessment Methods

Agricultural land use impacts could occur in two main categories: direct and construction-related impacts; and indirect and operational impacts.

Direct impacts are those changes in physical land uses, or in land use designations, which result from construction of new facilities or conversion of lands from one use to another. For purposes of this analysis, direct impacts are those that would occur if any of alternatives, or combinations of alternatives, were implemented.

Indirect effects occur later in time and could be further removed in distance. Indirect land use effects would be changes in broad land use policies, resources, or economies which could result from changes in land uses, or in the long-term availability of water resources. Potential indirect and operational impacts of the program include long-term changes in the number of acres in agricultural use.

As a Programmatic EIS/EIR, this assessment does not provide site-specific details or specific estimates of acreages potentially affected for a given alternative. Rather, potential increases or decreases in agricultural land uses by region is qualitatively estimated, or described with a range of gross acres.

8.2.2.2 Significance Criteria

The following would have potentially significant agricultural ~~land use~~ physical effects:

- Impacts upon any lands classified as prime and unique farmlands
- Conversion of agricultural lands or losses of croplands
- Inconsistency with agricultural objectives of local and regional plans
- Water level changes that would impact agricultural lands
- ***Reduction in water available to agricultural land***

these aren't the same as the TR

This section also addresses the land use significance criteria recommended in the *State*

CEQA Guidelines.

- affect agricultural resources or operations (e.g., impacts to soils or farmlands, or impacts from incompatible land uses);
- conflict with applicable environmental plans or policies adopted by agencies with jurisdiction over the project; or
- conflict with general plan designations or zoning.

8.2.2.3 Comparison of No Action Alternative to Existing Conditions

The key changes between current conditions and No Action conditions involve converting agricultural land uses to accommodate facilities associated with reasonably foreseeable future actions. Additional agricultural impacts are anticipated from urbanization of agricultural lands as Central Valley towns and cities grown in population. Specific agricultural land use impacts (versus impacts to open space or municipal and industrial lands) would depend upon the actual location of the modifications and improvements to be implemented under the No Action Alternative.

(Beef this section up with discussion from Ag. Impact Tech. Report . . .)

(Include discussion of CVPIA land retirement program . . .)

8.2.2.4 Comparison of Program Alternatives to No Action Alternative

(Add Text Box with Rick's Wording)

need Physical Impact Table

All Regions

Table 3 provides a summary of potential impacts on agricultural land in production for all regions by alternative variation. Table 4 presents potential impacts on agricultural water use for all regions by alternative variation. Table 5 provides a summary of potential impacts on agricultural revenues and costs by region by alternative variation. These impacts are discussed in region-specific discussions that follow. (Add tables to the document)

Delta Region this doesn't include impacts from the common programs, only stor & conv.

Alternative 1. Configurations 1A and 1B do not include storage or conveyance components. Configuration 1C includes some enlarged Delta channel capacity plus potential surface and groundwater storage.

Storage and Conveyance

Potential direct and significant adverse land use impacts of new or expanded surface storage would be, in general, converting existing land uses for these improvements. Specific land use impacts would depend on the exact location of the new storage facility. For purposes of this programmatic analysis, it is assumed that most new reservoir sites would be located in the foothills rather than in flat, valley-bottom areas where agriculture land uses would predominate. Therefore, storage components of Configuration 1C would likely affect less productive agricultural lands, such as grazing lands, and not the prime farmland generally found in the flatter valley.

Prime and unique farmland could be affected by the Alternative 1 configurations. Loss of this farmland is considered a significant adverse land use impact. Conversion of prime or unique farmland to other uses could also conflict with local or regional agricultural land use plans or policies, which could be a significant impact.

The Delta Protection Commission provides regional coordination among various agencies in the Delta Region. The Commission's *Land Use and Resource Management Plan for the Primary Zone of the Delta* (Delta Protection Commission 1995) sets forth land use goals for the Region. All local general plans for areas within the Delta Primary Zone (which comprise the majority of the Delta) are required to be consistent with the

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regional plan. These include general plans from Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties.

The specific locations of improvements contemplated for Alternative 1 configurations have not been identified for this programmatic-level analysis. Thus, the consistency of project alternatives with general plan land use designations or zoning are not evaluated herein. However, inconsistency with these plans could result in a significant adverse land use impact.

The Water Transfer Program would affect land use economics primarily through changes to agricultural, open space, habitat, and developed land use. However, the Water Transfer Program is not expected to affect open space or developed land use because the augmented water supply is assumed to replace existing water supplies. In addition to the source of water for a transfer, the timing, magnitude, and pathway of each transfer have a tremendous effect on the potential for significant impacts. The water source varies according to the water transfer category: crop fallowing (surface water or groundwater), shifting to a crop with a lower water demand (surface water or groundwater), groundwater substitution for surface water (surface water), direct groundwater transfers (groundwater), conserved water (surface water or groundwater), and stored water in reservoirs (surface water).

Potential significant beneficial impacts are associated with the transferred water's destination, and include: 1) increasing agricultural acreage in areas with limited water supplies; and 2) increasing habitat acreage in areas with limited water supplies.

Potential significant adverse impacts are associated with the transferred water's origin, and include: 1) decreasing agricultural acreage due to crop fallowing; 2) decreasing agricultural acreage due to increased costs resulting from direct groundwater or groundwater replacement transfers; 3) causing land use changes that could be inconsistent with local agricultural objectives; and 4) decreasing habitat acreage.

Alternative 2. Potential impacts on agricultural land uses in the Delta under Alternative 2 are anticipated to be similar to those described under Alternative 1. The main differences between Alternatives 1 and 2 involve the storage and conveyance components. Channel widening and island flooding will require purchasing and converting agricultural lands. Adverse land use impacts of the modifications would potentially be significant.

There would be substantial in-Delta water conveyance capacity increases under Alternatives 2 and 3. However, under Alternative 3, the isolated transfer facility would provide water transfer opportunities that exceed those under Alternative 2.

Potential significant land use impacts for Configuration 2D would be similar to those for Configuration 2A, with additional adverse impacts related to purchasing and converting agricultural land for open space in the form of floodway, conveyance channel, or habitat. Configuration 2E eliminates certain in-channel conveyance and adds additional habitat from inundating Tyler Island. Land uses converted under Configuration 2E could be a significant adverse impact.

Prime and unique farmland could be affected by storage and conveyance components of the Alternative 2 configurations. Loss if this farmland is considered a significant adverse land use impact. Conversion of prime or unique farmland to other uses could also conflict with local or regional agricultural land use plans or policies, which could be a significant impact.

Alternative 3. Potential land use impacts on land uses in the Delta under Alternative 3 are anticipated to be similar to those described under Alternative 1. The main differences between Alternatives 1 and 3 involve the storage and conveyance components.

Potential direct land use impacts would be different for an open channel vs. a buried pipeline. Creating an open channel isolated

conveyance would be a significant adverse land use impact due to permanently converting underlying land uses from agriculture (primarily) to open space. Constructing a buried pipeline isolated conveyance, however, would be a short-term, temporary adverse impact on surrounding land uses. Any agricultural land uses affected could resume after completing pipeline construction.

Potential impacts for Configuration 3A are similar to Configuration 2A, except for proposed Delta island flooding. An open channel isolated conveyance would require converting agricultural land for the canal and right-of-way. Potential land use impacts would be significantly adverse.

Potential impacts of Configuration 3B are similar to those described for Configuration 3A, except that in-Delta storage would require converting existing agricultural lands. Delta agricultural land use impacts from Configuration 3E are similar to those for Configuration 3B and would be significant.

Land use impacts of Configuration 3H are similar to Configuration 2E, but with more agricultural land purchased for right-of-way for a conveyance canal than for a pipeline. Potential land use impacts would be significantly adverse.

Prime and unique farmland could be affected by the Alternative 3 configurations. Loss of this farmland is considered a significant adverse land use impact. Conversion of prime or unique farmland to other uses could also conflict with local or regional agricultural land use plans or policies, which could be a significant impact.

All Alternatives. Ecosystem restoration and levee system integrity program elements could have significant impacts on agricultural land uses under all alternatives.

Ecosystem Restoration Program. The ecosystem restoration program recommends conversion of land in the Delta Region to habitat and ecosystem restoration, levee setbacks, and floodways. In general, agriculture is the dominant land use on the non-conveyance side of levee structures in the Delta. Given these general land use patterns, it can be expected that existing agricultural uses will potentially be affected by ecosystem restoration program improvements. Some of these agricultural uses likely will be shifted to the Central Valley or elsewhere.

Loss of Ag. Water describe worst case scenario

include impacts from Common Programs

Bay Region

Alternatives 1, 2, and 3. County general plans in the Bay Region which could be applicable to land use impacts include those of: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, and Sonoma Counties. Principal local plans include those of the cities of: Berkeley, Oakland, San Francisco, and San Jose. The compatibility and consistency of potential actions with these plans is not evaluated in this programmatic-level analysis. However, inconsistency between applicable Alternative 1 program elements with these plans could result in a significant adverse land use impact.

Potential land use impacts to prime and unique farmland in the Bay Region are anticipated to be minimal and insignificant, and have not been quantified.

Sacramento River Region

Alternatives 1, 2, and 3. Storage facilities proposed under Configuration 1C, 2B, 2E, 3B, 3E, 3H, and 3I could result in converting agricultural land uses in the foothill or mountain areas, a potentially significant adverse impact. Development of storage facilities could also conflict with local and regional plans regarding agricultural lands.

County general plans in the Sacramento River Region which could be applicable to land use impacts include those of: Butte, Colusa, Glenn, Lake, Lassen, Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Solano, Sutter, Tehama, Yolo, and Yuba Counties. Principal local plans include those of the cities of: Chico, Sacramento, Redding, and Davis. The compatibility and consistency of potential actions

with these plans is not evaluated in this programmatic-level analysis. However, inconsistency between applicable Alternative 1 program elements with these plans could result in a significant adverse land use impact.

Prime and unique farmland could be affected by the program elements of either Alternatives 1, 2, or 3 configurations.

All Alternatives. Ecosystem restoration and watershed management coordination efforts could have significant impacts on agricultural land use under all alternatives.

Ecosystem Restoration Program. The ecosystem restoration program could convert agricultural land, primarily on the east side of the valley and the valley trough.

Watershed Management Coordination. Potential watershed activities in the Sacramento River Region will be compatible with applicable agricultural land use plans and policies in their affected jurisdiction. Reduced grazing activities could also have potential significant land use impacts in this region if they result in a loss of agricultural productivity.

Water Transfers. Potential water transfer program impacts would be similar to those discussed under the Delta Region.

San Joaquin River Region

Alternative 1. Storage and conveyance facilities proposed under Configuration 1C could also result in converting agricultural land uses, a potentially significant adverse impact.

County general plans in the San Joaquin River Region which could be applicable to land use impacts of the CALFED alternatives include those of: Amador, Calaveras, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, Tuolumne, and Tulare Counties. Principal local plans include those of the cities of: Fresno, Bakersfield, Stockton, and Modesto. The compatibility and consistency of potential CALFED actions with these plans is not evaluated in this programmatic-level analysis. However, inconsistency between applicable Alternative 1 program elements with these plans could result in a significant adverse land use impact.

Prime and unique farmland could be affected by program elements of the Alternative 1 configurations.

Alternative 2. Impacts from storage facilities under Configurations 2B and 2E would be similar to those described above for Configuration 1C.

Alternative 3. Impacts from storage facilities under 3B, 3E, 3H, and 3I would be similar to those described under Configuration 1C.

All Alternatives. Ecosystem restoration and watershed management coordination could have significant impacts on agricultural land use in the San Joaquin River Region under all alternatives.

Ecosystem Restoration Program. The ecosystem restoration program could convert agricultural lands for habitat restoration in the San Joaquin River Region. These components would affect primarily lands east of the San Joaquin River, and could be a significant adverse land use impact.

Watershed Management. Potential watershed activities in the San Joaquin River Region will be compatible with applicable environmental and land use plans and policies in their affected jurisdiction. Reduced grazing activities could also have potential significant land use impacts in this region if they result in a loss of agricultural productivity.

Water Transfers. Potential water transfer program impacts would be similar to those discussed under the Delta Region.

SWP and CVP Service Area Outside the Central Valley.

Alternatives 1, 2, and 3. County general plans in CVP and SWP Service Areas outside the Central Valley which could be applicable to land use impacts include those of: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura Counties. Principal local plans include those of the cities of: Los Angeles, Anaheim, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura. The compatibility and consistency of potential actions with these plans is not evaluated in this programmatic-level analysis. However, inconsistency between alternative configurations and with these plans could result in a significant adverse land use impact.

Potential land use impacts to prime and unique farmland in SWP and CVP Service Areas outside the Central Valley under all alternatives are anticipated to be minimal and insignificant, and have not been quantified.

All Regions

All Alternatives. The water quality and water use efficiency programs could have similar effects on agricultural resources for all alternatives in all five regions.

Water Quality Program. The water quality program focuses on source control and reducing the release of pollutants into the Bay-Delta system and its tributaries. The program is not anticipated to have direct or indirect land use impacts in any of the five regions.

(Change sentence above and describe the potential for idling agricultural problem drainage lands from the San Joaquin Region)

Water Use Efficiency Program. The water use efficiency program is not anticipated to have direct land use impacts in any of the five regions. The program relies on incentives, technical assistance, and policies to be implemented by local agencies, rather than mandatory measures and targets for water use efficiency.

Indirect changes in land use may result in all five regions from the water use efficiency program. In some instances, agricultural land may be removed from production because of increased costs and decreased profitability which could result from required efficiency improvements or increased district water charges (for example, as part of tiered water pricing). Conversely, improved efficiency may allow the continued viability of agriculture in some areas. This will tend to maintain the existing uses of agricultural lands in some regions and reduce the amount that may go out of production or become urbanized. Efficiency improvements that result in greater water supply reliability but also higher annual cost may cause a shift in the types of crops grown. Conversion or loss of agricultural land would be a potentially significant adverse land use impact of the program. Improvement in the long-term viability of some agricultural lands would be a potential beneficial impact.

8.2.2.4 Comparison of Program Elements to Existing Conditions

The primary actions that differentiate existing conditions and No Action conditions are the CVPIA and Bay-Delta Accord. These actions are currently being implemented, therefore, the magnitude and intensity of impacts would be similar if existing conditions were the baseline for assessment.

8.2.2.5 Mitigation Strategies

The following strategies shall be implemented to mitigate potentially significant land use impacts:

Select program actions that result in the least impact to agricultural objectives and operations in the area. Preserve identified prime and unique farmlands as a priority.

To the extent practicable, select program actions that are consistent with local and regional land use plans. Consult and work with local jurisdictions early in the Phase III planning and environmental review process. If necessary and

practical, work with local and regional jurisdictions to amend local plans and policies to bring program elements into compliance.

If applicable and where feasible, schedule construction activities in a manner so that current crops may be harvested prior to construction initiation. Pay fair market value for any crops destroyed or taken out of production on private or leased lands as a result of project construction;

If necessary, compensate property owners for the value of their land and associated improvements, including dwelling units, in compliance with state regulations for providing relocation assistance to displaced persons or businesses;

Coordinate with the applicable jurisdiction and apply for a zoning or general plan change, if necessary.

Promote geographically broad-based water transfers and ensure that no one area is involved in a disproportionately large amount of transfer activity; and encourage conjunctive use of surface and groundwater resources, which would encourage maintenance of agricultural production in selling regions without adversely impacting groundwater resources. The potential consequence of these measures is to decrease the amount of water that can be transferred.

8.2.2.6 Potentially Significant Unavoidable Impacts

Program actions associated with the ecosystem restoration program, levee system integrity program, or storage and conveyance components could convert existing agricultural uses, including prime and unique farmland. Locally implemented water transfers could also convert existing agricultural land uses to other land uses, though not specifically CALFED Program uses.

8.2.3 Environmental Consequences: Agricultural Economics

8.2.3.1 Assessment Methods

Each of the major categories of program elements could potentially affect agricultural economics and production. Assessment variables for agricultural economic impacts are irrigated acres, agricultural water and land use, water quality, costs and revenues from agricultural production, and risk and uncertainty. Potential impacts are quantified based on existing estimates of land and water value, crop revenue per acre, and costs. Each configuration (e.g., 1A, 1B) is evaluated as part of an alternative. All of the potential impacts described are based on review of and experience with other studies.

Estimates of water supply changes, land conversion, and costs are made using existing policy-level models, such as the Central Valley Production Model, and by interpolating or extrapolating estimates made in other studies.

Changes in water quality are modeled for a number of scenarios that correspond to various CALFED alternatives. Key measurement points in the Delta are used to indicate the Total Dissolved Solids of water diverted for irrigation. TDS (measured in ppm) is converted into electrical conductivity (EC) measured as millimhos per centimeter, using the approximation that 1 mmho/cm equals about 640 ppm.

Potential impacts on crop yield are based on the standard Maas-Hoffman (MH) salinity threshold relationships. For a given crop, the MH relationship defines the soil water salinity at which crop yield begins to be affected, and shows the estimated rate at which yield declines as soil salinity increases beyond the threshold. **Table 8.2.3-1** shows the threshold and rate of decline due to salinity for major categories of crops grown in the Delta.

8.2.3.2 Significance Criteria

Criteria used to judge whether an impact is potentially significant to agricultural resources are described below. Significance criteria are applied only to adverse impacts.

- **Irrigated Acres**: Permanent or long-term reduction in acres exceeding five percent of irrigated land within a region would be considered significant. Changes less than this are easily within historical variations due to weather and farm programs.

- **Agricultural Water Use**: Any increase in groundwater pumping that would cause or exacerbate overdraft of a basin would be considered significant. A change in surface water use could be significant if it leads to changes in land use or higher regional unemployment.

- **Agricultural Land Use**: Permanent or long-term reduction in agricultural acreage exceeding 5% of irrigated land within a region or the conversion of any lands categorized as prime or unique farmlands would be considered significant.

- **Water Quality**: Impacts of water quality changes on agriculture may be caused by changes in the salinity of water used for irrigation, measured as TDS. Potential impacts could arise because of reduced yields of salt-sensitive crops, additional water application and management costs due to salinity, or foregone revenue due to restricted crop selection. Several components of the CALFED program could affect the TDS of water delivered for agricultural use, including flows associated with the ERP, storage and conveyance components, and BMPs or other components of the Water Quality Program. A change in water quality that would reduce crop yields by 10% is considered significant.

- **Production Costs and Revenues**: Changes in costs and revenues would not, in themselves, be considered significant environmental

These are different than in the TR

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Crop Category	Irrigated Acres (1,000 acres)	Threshold Salinity Level (Ece)	Percent Yield Decrease From the Threshold (%)
Pasture	37	5.0	10.0%
Rice	11	3.0	12.0%
Truck Crops	28	1.5	14.0%
Tomatoes	45	2.5	9.9%
Alfalfa	65	2.0	7.3%
Sugar Beets	15	7.0	5.9%
Field Crops	151	1.7	15.0%
Orchards	61	1.5	12.0%
Grains	60	6.0	7.1%
Grapes	36	1.5	19.0%

NOTE:
The salinity of the soil saturation extract is expressed as Ece which is the electrical conductivity (in mmho/cm).
SOURCES:
1. Irrigated acreage is from Affected Environment and Environmental Impacts: Agricultural Production and Economics, CALFED Bay-Delta Program, September 1997.
2. Maas-Hoffman coefficients are described in United Nations, Food and Agriculture Organization Irrigation and Drainage Paper 29, "Water Quality For Agriculture," 1976.

Table 8.2.3-1. Major Crops in the Delta Region and Corresponding Maas-Hoffman Coefficients.

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impacts. However, changes in costs or revenues could change the economics of farming to an extent that land use, water use, and employment could be affected.

- **Risk and Uncertainty**: No objective or numerical thresholds have been identified for judging the significance of changes in risk or uncertainty of agricultural production. Adverse impacts may be judged potentially significant if they have the potential for affecting agricultural land use and water use decisions.

8.2.3.3 Comparison of No Action Alternative to Existing Conditions

The predominant changes between existing conditions and the No Action conditions that would affect agricultural economics are: changes in the markets for agricultural products, the supply and reliability of irrigation water, changes in water quality, development of water transfer markets, and the cost of water.

- **Changes in the Agricultural Market**: There will be an increasing demand for fruits and vegetables, resulting in a shift away from field crops and grain production.

- **Irrigation Water Supply**: Several important changes have occurred to water supply conditions for agriculture. The CVPIA reallocates up to 800,000 AF of CVP water per year away from agricultural use for environmental restoration. Likewise, the 1994 Bay-Delta Accord reduces the amount of water pumped from the Delta and delivered for agricultural and municipal uses.

- **Water Quality**: Reasonably foreseeable changes in water management are expected to affect water quality, thereby impact agricultural yields. As shown in **Table 8.2.3-2**, the expected TDS range is between 109 ppm to 389 ppm or between an EC or 0.17 to 0.61 mmho/cm.

- **Water Transfers**: The use of water transfers will likely increase in the future, however, they have not been assessed in this report due to the uncertainty and speculation involved.

- **Cost of Water**: Implementing cost-of-service and tiered water pricing, plus the restoration charges and surcharges imposed by the CVPIA, will increase the cost of water by up to 100% in some CVP service areas. Also, districts looking for water to transfer are almost certain to spend more for that water than they have in the past.

Ag Econ is missing "All Alt, All Regions"

8.2.3.4 Comparison of Program Alternatives to No Action Alternative

Delta Region

All Alternatives. In the middle Delta, irrigation water quality under all alternatives averages between 121 and 240 ppm, which converts to an EC range of 0.22 to 0.37 mmho/cm (**Table 8.2.3-2**). The average EC during the months of highest salinity ranges from 0.21 to 0.42. Assuming an effective leaching fraction of 15%, the soil salinity would be 1.5 x 0.42 = 0.63 under the worst case of Alternative 3D. The most sensitive vegetable crops begin to experience salinity effects at 1.0 EC. Therefore, no significant positive or negative impact is expected from water quality changes in the middle Delta.

TDS in the south Delta is substantially higher than in the middle Delta. As shown for the Old River at Middle River location in Table 8.2.3-2, average water quality ranges from 318 to 378 ppm, depending on the alternative. This converts to a soil salinity of 0.75 to 0.88, assuming an effective leaching of 15%. During months of the poorest water quality, salinity of applied water can be 450 ppm. This level of salinity approaches the yield threshold for several salt sensitive truck crops, including beans and strawberries, and some care in water

Shouldn't some description of the common programs go under All Alt. here?

management is required to avoid yield losses. However, none of the alternatives show any significant change in salinity compared to the No Action Alternative, therefore no significant positive or negative impacts are apparent.

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Table 8.2.3-2

Alternative 1. Direct impacts of the ecosystem restoration program would be most felt in the Delta region. Agricultural acres would be taken out of production. Depending on the mix of crops affected, this would result in a gross revenue loss of from to $50 to $135 million per year. Some of this acreage and revenue would likely shift to other regions of the state, placing more demand on existing surface water and groundwater resources in those regions.

Control of upstream drain water quality and quantity from implementing the water quality component could reduce salinity of water diverted in the Delta for irrigation. Benefits could include reduced costs, higher yields, and more flexible crop selection. Water quality BMPs, if applied to Delta agriculture, could raise production costs.

The levee system integrity program would benefit Delta agriculture by providing greater protection from inundation and salinity intrusion. Setback levees would require purchasing and converting agricultural land. The value of crops out of production could be between $6 and $13 million per year. Some prime farmland would be converted for levee setbacks or other improvements. This loss may be offset by lower flood risks to remaining farmlands.

Configuration 1B would require prime farmland for constructing south Delta facilities. Configuration 1C would convert up to 400 acres of farmland to enlarge Delta channel capacity and for surface and groundwater storage facilities. The economic impact would be negligible.

Potential charges imposed on agricultural water use to recover costs of program components could lead to significant changes in agricultural activities (e.g., land use, crop selection, water use).

Farmland would be lost under Alternative 1. Potentially impacted lands are considered prime and unique farmlands, constituting a significant impact. Additionally, the loss of farmland may adversely affect the financial viability of local agencies, especially water and reclamation districts.

The Water Transfer Program would affect agricultural economics primarily through changes to irrigated acreage, agricultural water use, and production costs and revenues. In addition to the source of water for a transfer, the timing, magnitude, and pathway of each transfer have a tremendous effect on the potential for significant impacts. The water source varies according to the water transfer category: crop fallowing (surface water or groundwater), shifting to a crop with a lower water demand (surface water or groundwater), groundwater substitution for surface water (surface water), direct groundwater transfers (groundwater), conserved water (surface water or groundwater), and stored water in reservoirs (surface water).

Because transfers can invoke both beneficial and adverse impacts, at times on the same resource, the net environmental effect of a water transfer within and between resources must be considered when determining a transfer's overall effect on the environment.

Potential significant beneficial impacts are primarily associated with the transferred water's destination, and include increasing irrigated acres; decreasing unemployment in the area of use; increasing demand for farm products in the area of use; and increasing demand for crop storage and processing in the area of use. Other potential significant beneficial impacts are associated with the transferred water's origin, and include increasing income from the transfer to farmers or agricultural entities serving as the transferor; and increasing agricultural-related capital improvements to farms from income derived from water transfers.

Potential significant adverse impacts are associated with the transferred water's origin, and include changes to irrigated acreage, water use, and revenue. Water transfers due to crop fallowing and crop shifting can affect farmers, farm workers, and agribusiness, and include

reducing irrigated acres due to fallowing; increasing unemployment; reducing demand for farm products, including seed and agricultural chemicals; reducing demand for crop storage and processing; and increased operating costs by increasing groundwater lift.

Due to minimal in-Delta conveyance facility changes, conveyance capacity will continue to be the principle limiting factor to water transfers. The number and magnitude of water transfers will continue to be relatively small, except in critically dry years. The Water Transfer Program will influence only a fraction of Central Valley and Delta flows, generally increasing base flows but not exacerbating high flows.

Alternative 2. Potential impacts to agriculture from program elements within Alternative 2 are expected to be similar to those described under Alternative 1.

The major difference between Alternatives 1 and 2 is in the storage and conveyance components. For all Alternative 2 configurations, conveyance options would require land conversion of largely prime farmland, producing crop revenues of between $1.9 and $6.2 million per year. Loss of this revenue would be a substantial adverse economic impact.

There would be substantial in-Delta water conveyance capacity increases under Alternatives 2 and 3.

Alternative 3. Potential impacts to agriculture from program elements within Alternative 3 are expected to be similar to those described under Alternative 1.

The major difference between Alternatives 1 and 3 is in the storage and conveyance components. Conveyance and storage options would require land conversion of largely prime farmland, producing crop revenue of between $2.3 and $21 million per year. The mix of crops removed depends on the location of the reservoir, and could range from a mix of field and forage crops (corn, grain, and pasture) to high-valued orchards. The agricultural land would be purchased at a negotiated fair market value to reduce economic hardship on local farmers. In-Delta storage would have potential negligible to minor beneficial effects on agricultural production in other parts of the Delta Region, by providing more reliability in flows and deliveries. Impacts to farm employment, agricultural suppliers, and other economic sectors are described in the Regional Economics Technical Report. Loss of this land would be a significant impact with an adverse economic effect. Impacts of water supply increases within the Delta Region would be small, similar to or less than those described under Alternative 1.

Under Alternative 3, the isolated transfer facility would provide water transfer opportunities that exceed those under Alternative 2. Other impacts would be the same as discussed under Alternative 2.

Bay Region

Alternative 1. Impacts for Configurations 1A and 1B from the ecosystem restoration program on agriculture are expected to be minor and similar to No Action conditions. To the extent that they apply to areas non-tributary to the Delta, BMPs under the water quality and water use efficiency programs could substantially increase production costs.

The levee system integrity program would reduce salinity intrusion in the Bay Region, representing a beneficial effect. Because of water supply deficiencies in some agricultural areas, especially the San Felipe Division of the CVP, water transfers may be an important source of water in the future. Up to 3,000 AF of irrigation water per year could be available from the Storage and Conveyance components of Configuration 1C, although the cost may remain high.

Potential charges imposed on agricultural water use to recover costs of program components could lead to significant changes in agricultural activities (e.g., crop selection, water use).

Alternatives 2 and 3. Impacts to agriculture in the Bay Region would be similar to Alternative 1, although the amount of additional water available for irrigation from the storage and conveyance components would range from 1,400 to 3,500 AF/year.

Sacramento River and San Joaquin River Regions

All Alternatives. Salinity of water diverted from the Delta for use in the San Joaquin Valley is estimated using the Tracy Pumping Plant Intake as the measurement location. As seen in **Table 8.2.3-2**, average salinity ranges from 278 ppm in the No Action Alternative to a low of 127 ppm in Alternative 3D. The highest salinity months range from 366 ppm to No Action down to 177 ppm in Alternative 3D. Soil salinity associated with these average values would range from 0.30 to 0.65. The highest salinity is estimated in the No Action Alternative, and the lowest in Alternative 3. Some areas receiving water from the Delta also have poor drainage, and some areas apply a mixture of groundwater and surface water. Therefore, the improvements to water quality, especially in Alternative 3, are potentially large enough to have some effect on crop selection, water management, and yields, and could provide a potentially significant benefit.

These estimates account for water quality changes due to water supply, conveyance, and operations changes. Impacts associated with the Water Quality Program and the Water Use Efficiency Program could potentially affect agricultural users, but the size and direction of these impacts in unclear. No estimates of changes in water quality for irrigation have been made for the Sacramento River Region.

Alternative 1. The ecosystem restoration program would convert productive farmland in the Sacramento River Region and the San Joaquin River Region to habitat, or for taking the land out of production to support instream flow water purchases. About half of these lands are classified as prime farmland. The crop revenue loss associated with these lands generally ranges from $500 to $1000 per acre, resulting in a regional loss in crop revenue of between $13 and $34 million per year in the Sacramento River Region and between $25 and $50 million in the San Joaquin River Region. This would have a substantial adverse economic impact on farm revenues, income generation, and employment levels. Loss of production may also adversely affect the financial viability of local agencies, especially water and reclamation districts.

BMPs for the water quality and water use efficiency programs could lead to significant impacts (both beneficial and adverse) in land and water use patterns. Adverse impacts would more likely result from costs imposed. Beneficial effects include reduced salinity of irrigation, which could increase yields, reduce production costs, and provide more flexible crop selection.

More carefully monitored application of water can result in substantially increased yields and reduced chemical costs, irrespective of salinity. Lower applied water amounts can adversely affect drain water users (forcing them to search for another source of supply), raise groundwater pumping lifts and impair groundwater storage for conjunctive use.

Retirement or idling of agricultural land with water quality/drainage problems in the San Joaquin River Region has been considered for inclusion in the Water Quality Program. However, at this time, neither the number of acres nor the location of proposed land conversion or idling have been defined. The Water Quality Technical Team and stakeholders with continue to discuss the water quality, economic, and environmental benefits and costs of implementing a agricultural land idling program to improve water quality.

Implementation of upper watershed enhancements could result in converting agricultural lands located adjacent to waterways in order to restore riparian habitat, stabilize stream-channels, restore natural stream hydrology, and create a non-point source pollution buffer. Conversion of land use could

have an adverse impact on net income and public finances, and result in foregone economic opportunities.

Any changes in water supply, such as purchase of water rights for in-stream flow, could result in changes to cropping patterns, potentially affecting corp value. Direct impacts to the landowner would not be significant because the transaction would be only with willing sellers. Changes in the quantity or pattern on in-stream flow could affect downstream agricultural users, and could potentially be significant.

The economic impact of the water use efficiency program is uncertain, and could range from little or no measurable effect to potentially substantial reductions in applied water. Based on preliminary estimates prepared for the CALFED program, costs of achieving efficiency increases could range from $40 to $60 per AF of reduced applied water in the Sacramento River Region and from $50 to $100 per AF in the San Joaquin River Region. In the San Joaquin River Region, approximately $500 per AF of net savings could be realized; however, because virtually all applied water losses are recoverable and reusable in the Sacramento River Region, no net savings in consumptive use or irrecoverable loss (i.e., "real" water savings) are likely. Additional district-level costs could range from $5 to $12 per acre of land served in both regions.

Agricultural lands in the Sacramento Region and the San Joaquin River Region could be affected by the location of storage and conveyance facilities. The likely location of large storage facilities is in foothill or mountain areas, where land use is likely to be non-irrigated grazing. Impacts include permanent conversion and inundation and temporary disruption of agricultural activity during construction. Permanent conversion of farmland for facilities is a potentially significant impact. Impacts from improvements in water supply reliability are small in the Sacramento River Region.

Under Configuration 1C, additional water supply could range up to 35,000 AF/year in the Sacramento River Region and up to 167,000 AF/year in the San Joaquin River Region. Potential beneficiaries in the Sacramento River Region would be primarily CVP contractors, who would use the water to replace groundwater or supply lost from the CVPIA. According to an analysis completed for CVPIA, the direct value of this water to agriculture ranges from $30 to $40 per acre-foot, making it relatively costly. Much of the additional water in the San Joaquin River Region would be used to reduce groundwater overdraft, to increase instead flows, to support production of lands fallowed by supply restrictions of the CVPIA and Bay Delta Accord, and for agricultural production. The marginal value of this water for agricultural production is $60 to $100 per AF.

Potential charges imposed on agricultural water use to recover costs of program components could lead to significant changes in agricultural activities (e.g., crop selection, water use).

The Water Transfer Program would generally have the same beneficial and adverse impacts as identified for the Delta region. However, another potential significant beneficial impact of reduced pumping costs due to receiving a water transfer could occur. Similarly, other potential significant adverse impacts could occur. Water transfers due to direct groundwater pumping or groundwater substitution could cause a temporal or volumetric increase in groundwater pumping and increased costs associated with exacerbating groundwater overdraft; pumping from lowered groundwater levels; deepening wells; lowering pumps; and redrilling wells. These increased operating costs could reduce irrigated acreage at nearby farms that are not transferring water. Direct groundwater and groundwater substitution transfers could also cause a reduction in surface water flows due to induced seepage; reduce crop yields due to lower water quality; reduce demand for crop storage and processing; reduce demand for farm inputs; lower ground elevations, making affected areas more susceptible to flooding; and reduce habitat supported by surface seepage of groundwater.

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Alternative 2. Impacts to agriculture in the Sacramento River and San Joaquin River Regions would be similar to Alternative 1. The amount of additional water available for irrigation from the storage and conveyance components would range from an average of 10,000 AF/year in Configuration 2A to about 35,000 AF/year in Configurations 2B and 2E in the Sacramento River Region and from an average of 48,000 AF/year in Configuration 2A to about 167,000 AF/year in Configurations 2B and 2E in the San Joaquin River Regions. The delivery areas and the nature of impacts would be similar to those described under Configuration 1C. Some of this water could support acreage shifted out of the Delta Region due to land conversion.

Productive agricultural lands would also be affected by the location of storage and conveyance facilities in the San Joaquin River Region. The likely location of large storage facilities is in foothill or mountain areas, where land use is likely to be non-irrigated grazing. Impacts include permanent conversion and inundation and temporary disruption of agricultural activity during construction.

Alternative 3. Impacts for all configurations would be similar to those described under Alternatives 1 and 2. Configurations 3B and 3E, 3H, and 3I would provide much larger increases in supply during critical years, improving the overall reliability of irrigation water availability in both regions. This would be a beneficial impact, allowing production to continue when it would be reduced under No Action. The marginal value of this water for agricultural production is estimated to be $60 to $100 per acre-foot.

As with Alternative 2, agricultural lands could be affected by the location of storage and conveyance facilities in the San Joaquin River Region. The likely location of large storage facilities is in foothill or mountain areas, where land use is likely to be non-irrigated grazing. Impacts include permanent conversion and inundation and temporary disruption of agricultural activity during construction. Permanent conversion of farmland for facilities is a potentially significant impact.

Other SWP and CVP Service Areas Outside the Central Valley

All Alternatives. Impacts on agriculture in this region are expected to be small. Potential cost impacts from the water quality and water use efficiency programs may occur if BMPs are applied to areas outside the Central Valley. Salinity intrusion benefits of the levee system integrity program would also be felt in this region.

Substantial conversion of agricultural land in the Delta Region could shift some production to desert areas in Southern California, such as the Imperial Valley. Additional water would be available to SWP contractors in the South Coast and Central Coast areas. However, it is unlikely that a significant amount of this water would be delivered for irrigation use.

SWP water delivered for irrigation in Southern California would have the same quality changes as described for the San Joaquin River Region. Relatively little SWP water pumped into Southern California is used for irrigation, and some of that gets mixed with other local water sources. The aggregate impact on agriculture in these areas is potentially beneficial but probably not significant.

Potential charges imposed on agricultural water use to recover costs of program components could lead to significant changes in agricultural activities (e.g., crop selection, water use).

The Water Transfer Program benefits are related to the increased agricultural production, incomes, and employment opportunities associated with any transfer that uses the water for agricultural production outside of the Central Valley.

8.2.3.5 Comparison of Program Elements to Existing Conditions

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The primary actions that differentiate existing conditions and No Action conditions are the CVPIA and Bay-Delta Accord. These actions are currently being implemented and results forecasted. Therefore, the conclusions regarding the magnitude and significance of impacts would be the same if they are compared to existing conditions as compared to the No Action Alternative.

8.2.3.6 Mitigation Strategies

The large loss of prime farmland to the various program components may be mitigated by establishing provisions for reliable and affordable water supply to irrigate other agricultural lands in the San Joaquin River or Sacramento River Regions. This could include water from the storage and conveyance components if it is affordable.

No mitigation for the loss of prime farmland is possible within the Delta Region because sufficient undeveloped farmland does not exist. Some mitigation can be achieved by providing reliable and affordable water supply to other regions in California, primarily the Sacramento River and San Joaquin River regions. Some of this water supply could be provided from yield of the in-Delta storage project.

Loss of income to farmers is directly mitigated by the fair market price paid for the converted land. Mitigation for impacts to regional employment are described in the Regional Economics Technical Report.

Mitigation measures to reduce potential significant adverse impacts are: minimize the amount of acreage that can be fallowed in a given area; provide job referral and placement services and job retraining; avoid fallowing or shifting crops that require high input and output expenditures; limit the proximity and/or capacity of wells that can be used to develop water either for a direct groundwater transfer or groundwater substitution transfer, and operate a groundwater level monitoring program to determine whether pumping should be shifted, terminated, or reduced in any of the transferring pumps; configure the transfer so that Water Code provisions stating that a water transfer cannot unreasonably affect any legal user of water are met; consider using a portion of the transferred water to be used to compensate for the surface water infiltration induced by the groundwater or groundwater substitution transfers; and develop and/or enforce minimum water quality standards specific to the crops being grown.

Additional mitigation measures include: promote conjunctive use of surface and groundwater resources, which would encourage maintenance of agricultural production in selling regions without adversely impacting groundwater resources; and promote geographically broad-based water transfers and ensure that no one area is involved in a disproportionately large amount of transfer activity. The potential consequence of these measures is to decrease the amount of water that can be transferred. County ordinances which limit the export of groundwater in an increasing number of counties also provide protection.

The water acquired for habitat purposes could be purchased using temporary or rotating contracts so that the same land or locality is not impacted every year.

Cost-sharing and other financial assistance could reduce the indirect impacts potentially resulting from the cost of water use efficiency and water quality programs. Mitigation for temporary, construction-related impacts should be identified in project-specific tiered analysis.

8.2.3.7 Potentially Significant Unavoidable Impacts

Unavoidable impacts to agricultural economics that have the greatest potential to be significant are loss of prime farmland to other uses, such as for habitat or levee setbacks. These impacts would be both direct, such as loss of farm revenue and production opportunities, and

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indirect, such as less labor demand and reduced farm spending for goods and services.

8.2.4 Environmental Consequences: Agricultural Resources: Social Issues

8.2.4.1 Assessment Methods

Social well-being, for purposes of this analysis, is measured in terms of community stability. Community stability is a measure of a communities' ability to absorb social and economic changes that may result from a proposed action such as the CALFED action. Assessment of community stability is based on changes in economic and social indicators that may occur as a result of a CALFED action. These indicators include median family income, per capita income, poverty rates and unemployment rates, as summarized by region in **Table 8.2.1-2**. Chapter 8.11 provides a detailed region by region discussion of related Environmental Justice issues.

Predicting the human behavior that could result from CALFED actions is a difficult task. Past studies of community stability and social conditions related to water supply projects have focused on social, economic, and land use changes resulting from short-term drought conditions. The actual effects of implementation of long-term water supply programs cannot be predicted with complete assurance, but must be projected based on assumptions of human behavior, primarily the assumed actions of farm managers and land owners implementing long-term changes to farm operations. This analysis is based on the regional economics analysis and projected changes to regional employment. These findings have been applied to the analysis for farmers, farm workers, and agribusiness.

8.2.4.2 Significance Criteria

For purposes of this analysis, socioeconomic effects are measured in terms of community stability. Community stability is measured by several economic indicators. Economic indicators include median and per capita income, poverty rates, and unemployment. Adverse impacts to community stability could result from changes to any of these indicators that substantially exceed historical fluctuations.

8.2.4.3 Comparison of No Action Alternative to Existing Conditions

All Alternatives, All Regions. The key factors that would affect farmers under the No Action Alternative include changes in the markets for agricultural products; the supply and reliability of irrigation water; the development of water transfer markets; and the cost of water. Increasing demand for fruits and vegetables is expected to result in a shift toward production of these commodities, and away from field crops and grains. Decreases in water availability due to the Central Valley Project Improvement Act (CVPIA) and the Bay-Delta Accord would likely be made up with groundwater supplies, however, depending on the size of the deficit, groundwater may not be able to completely compensate.

The number of agricultural jobs may increase in areas due to projected changes in crop production to higher value and more labor intensive crops. However, agricultural employment would remain seasonal. There could be improvements in mechanization for picking and sorting crops and other improvements that could eliminate tasks that are currently labor intensive. Changes in irrigation technology also may occur that could change farm labor needs. Changes to the population, crop production, and technology resulting in a decrease in employment opportunities or the duration of employment may create an increased need for social services to provide food, health care, and housing for those facing economic hardship. These needs may be seasonal or could be year-around depending on the extent of the change and the education, training, and technical skills of the population in the area affected.

8.2.4.4 Comparison of the Alternatives with the No Action Alternative

Delta Region

Alternative 1. The extent of impacts for Alternative 1 would vary due to the variation in water yield and the opportunity to shift agriculture to various parts of the Delta. Alternative 1 could result in a significant but perhaps mitigable impact to farmers, farm workers, and agribusiness as a result of agricultural land conversion. This conversion would result in changes in the number of jobs for farmers, farm workers, and agribusiness. The intensity of this adverse impact depends on the magnitude of job loss.

Alternatives 2 and 3. The extent of impacts for Alternatives 2 and 3 would vary due to the variation in water yield and the opportunity to shift agriculture to various parts of the Delta. Construction of floodway setbacks and wetlands habitat in Configurations 2D and 2E and Tyler Habitat in Configuration 2E would require conversion of farm land. Construction of the isolated facility in Configurations 3A, 3B, 3E, 3H, and 3I would require conversion of agricultural land. Land conversion for these alternatives would generally require less than 10,000 acres. The impacts to farmers would vary depending on the extent of the conversion. Impacts to farm workers and agribusiness would depend on the impact to farmers. Conversion of agricultural lands could result in the loss of jobs for farm workers. The severity of this impact would depend on the magnitude of farm worker job loss and the extent of mitigation efforts.

All Alternatives. Impacts from implementation of the water quality program, levee system integrity, and water use efficiency program in the Delta Region would be the same under all alternatives. Impacts from ecosystem restoration and water storage and conveyance vary by alternative as described below.

Ecosystem Restoration Program. Implementation of ecosystem restoration in the Delta would result in the conversion of agricultural lands to restored habitat. In Alternative 1 this conversion would result in changes in the number of jobs for farmers, farm workers and agribusiness. This job loss would be a potentially significant adverse impact depending on the magnitude of the job loss and extent of mitigation efforts.

In Configuration 1A, the most significant impact would be the concentrated loss of jobs for farm workers who tend to have limited skills. Stress may be put on existing social services, such as welfare and job training, to help provide transitions for displaced farm workers. With Configuration 1A, because the Delta Region is already experiencing high levels of unemployment and the labor force is primarily farm workers, the social and economic structure of these communities could be adversely affected. Examples may include higher demand for social services, increased crime, and loss of local small businesses such that customers may have to travel further to purchase supplies. Less technically skilled workers and those lacking basic education levels and English language skills may have more difficulty finding new employment.

Although the converted acreage remains constant with ecosystem restoration across alternatives, the loss of jobs decreases as additional water becomes available in Configurations 1B and 1C.

Per capita income for displaced farmers and families may decline and could be mitigated by social service and support programs, such as welfare and job training. Farm managers may be required to travel further to their place of employment or move to other areas to gain employment. The need to move or to be away from home and family for longer periods, could add additional burden to family members.

It is anticipated that displaced farm managers and technicians could find work in other regions or other jobs related to agriculture. While there may be a temporary increase in the need for social services to provide training or economic

assistance for a portion of these displaced workers, this need would not be expected to be significant.

Under Alternatives 2 and 3, the type of impacts associated with ecosystem restoration would be the same as those described for Alternative 1, however, the extent of impacts for Alternative 2 and 3 would vary due to the variation in water yield and the opportunity to shift agriculture to various parts of the Delta.

Water Quality Program. The impacts of the water quality program would be the same in the Delta Region for Alternatives 1, 2, and 3.

Water Use Efficiency Program. During the drought of early 1990s, many communities faced reduced employment resulting from significant reduction in irrigated acreage, which left farm laborers without jobs. To the extent that efficiency improvements would help improve water supply reliability, employment opportunities would be maintained. This would contribute to the stability of many local agricultural communities.

Job opportunities could be created by water use efficiency improvements. As irrigation management improves, so must the knowledge of those irrigating or scheduling irrigations. This would result in the need for more skilled labor, but at higher costs. In addition, the design and installation of new or improved on-farm or district water delivery systems would create more jobs for skilled laborers. It is conceivable that efficiency improvements, especially those that involve physical construction would add to local employment.

However, water use efficiency improvements also could have adverse impacts on farm labor. One benefit of improved irrigation efficiency that may be experienced by a farmer is a reduced need for labor, due either to less cultivation or changes in how crops are irrigated. The addition of pressurized irrigation systems would have the most substantial impact. With pressurized irrigation, what used to be the job of several workers, could be replaced by just one. It is estimated that as technology advances, 30 percent less labor would be needed to perform the same amount of work. This means that two out of three farm workers may be employed once efficiency measures are implemented.

Improved water use efficiencies often translate to higher crop yields and better quality of farm products. Such advances can increase on-farm direct income, benefitting the farmer's net income. This often translates to additional economic activity. Increased income also can help the overall economy in total sales and purchases and increase tax revenues that strengthen vital functions such as schools, roads, and social and health services.

Water use efficiency improvements also could result in improved crop yields. Improvements in the yield per acre-foot of applied water, even with possible reductions in water supply, would result in greater production of food and fiber on the same land. As populations continue to increase, not only in the state, but in the nation and globally, highly efficient food production would be an asset.

Sacramento River Region

Alternative 1. Configuration 1C would provide an additional 34,600 acre-feet per year of water, which could result in beneficial impacts to farmers in the form of the development of additional acreage shifted from the Delta due to land conversion, or changes to higher water use and higher value crops. Additional farm worker jobs may become available if additional acreage is developed.

Alternatives 2 and 3. Configuration 2A and 3A would provide an additional 10,000 acre-feet per year and 15,000 acre-feet per year, respectively of water for the Sacramento River Region, Configuration 2B would provide about 34,600 acre-feet per year, Configuration 2D would provide about 17,900 acre-feet per year, and Configuration 2E would provide about 34,600 acre-feet per year. Configurations 3B, 3E, 3H, and 3I would provide about 36,700 acre-feet per

year of water. The impacts of this additional water supply could include the development of additional acreage for agriculture, increased water supply reliability resulting in greater farm investments, and shifts to higher water use and higher value crops. The extent of this beneficial impact would vary and would be dependent on the ultimate cost of the water.

The Water Transfer Program would generally have the same beneficial and adverse impacts as identified for the Delta region. However, other potential significant adverse impacts at the transferred water's origin could occur. Agricultural sector workers' incomes could be reduced due to lowered groundwater levels from their own or others' direct groundwater and groundwater substitution transfers that increase costs to pump groundwater; deepen wells; lower pumps; and redrill wells.

Development of the storage and conveyance facilities in Configurations 2B, 2D, 2E, 3B, 3E, 3H, and 3I depending on the location, could require the conversion of agricultural lands resulting in a potentially significant impact to farmers. This impact could be offset by shifting acreage to other parts of the Sacramento River Region. Impacts to farm workers would depend on new acreage developed by farmers. Configuration 2A and 3A would likely result in minimal new jobs, however, Configurations 2B, 2D, 2E, 3B, 3E, and 3H could result in a significant number of jobs and a beneficial impact to farm workers as well as associated agricultural businesses.

All Alternatives. Impacts from implementation of the water quality program, levee system integrity, and water use efficiency program in the Sacramento River Region would be similar to those described under the Delta Region.

Ecosystem Restoration Program. The impacts in this region for Alternatives 1, 2, and 3 would be similar in character to those described for the Delta Region. Ecosystem restoration could result in conversion or idling of productive agricultural land in the Sacramento River Region. Conversion or idling of agricultural lands would result in a loss of jobs for farmers, farm workers, and agribusiness. The severity of this impact would depend on the magnitude of farm worker job loss and the extent of mitigation efforts.

Impacts to farm workers would depend on new acreage developed by farmers. Configuration 3A would likely result in minimal new jobs, however, Configurations 3B, 3E, 3H and 3I could result in a significant number of new jobs and a beneficial impact to farm workers as well as associated agricultural business.

Water Use Efficiency Program. The impacts from the water use efficiency and water transfer programs are the same as discussed under the Delta Region. Additional adverse impacts to local groundwater pumping and facility costs could occur under some conditions of direct groundwater transfers or groundwater substitution transfers.

San Joaquin River Region

Alternatives 1, 2, and 3. Ecosystem restoration could result in conversion or idling of productive agricultural land in the San Joaquin River Region. The impacts would be similar in character to those described for the Delta Region. ***However, the maximum amount of agricultural land conversion or idling under the Ecosystem Restoration Plan would be 9,000 to 11,000 acres.***

Although some agricultural land conversion or idling is being considered (for some drainage problem lands on the west side of the San Joaquin River Region) to improve water quality, neither the amount of nor the location of land conversions has been agreed upon .

Configuration 1C would provide an average of up to 166,700 acre-feet per year of additional water supply. Configuration 2A would provide an additional 48,300 acre-feet per year of water for the San Joaquin River Region, Configurations 2B and 2E would provide about 166,700 acre-feet per year, and Configuration 2D would

Numbers like this haven't been included under the program sections for each region. It's only here that it's included

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provide about 86,100 acre-feet per year. Configuration 3A would provide an additional 72,500 acre-feet per year of water for the San Joaquin River Region, and Configurations 3B, 3E, 3H and 3I would provide about 177,200 acre-feet per year. The impacts of this additional water supply could include the development of additional acreage, increased water supply reliability, resulting in greater farm investments, and shifts to higher water use and higher value crops. A significant amount of jobs could become available if additional acreage or higher labor demand crops were developed.

Development of the storage and conveyance facilities in Configurations 2B, 2D, 2E, 3A, 3E, 3H, and 3I depending on the location, could require the conversion of agricultural lands resulting in a potentially significant impact to farmers. This impact could be offset by shifting acreage to other parts of the San Joaquin River Region.

Impacts to farm workers would depend on new agricultural acreage developed by farmers. Configurations 2A and 3A would likely result in several new jobs. Configurations 2B, 2D, 2E, 3B, 3E, 3H and 3I could result in a significant number of jobs and a beneficial impact to farm workers as well as associated agricultural business.

All Alternatives. Impacts from implementation of the levee system integrity and water use efficiency program in the San Joaquin River Region would be similar to those described under the Delta Region.

Water Quality Program. ***Implementation of the water quality program would have similar effects to those described for the Delta Region, except for the additional conversion or idling of drainage problem farmland to achieve additional water quality improvements.***

Ecosystem Restoration Program. Ecosystem restoration could result in conversion or idling of up to 50,000 acres of agricultural land in the San Joaquin River Region. The impacts would be similar in character to those described for the Delta Region.

Water Use Efficiency, Water Transfers. The impacts from the water use efficiency and water transfer programs are the same as those discussed under the Sacramento Region.

Other SWP and CVP Service Areas Outside the Central Valley

All Alternatives. Impacts on agriculture in this region. expected to be small. Substantial conversion of agricultural land in the Delta Region could shift some production to desert areas in Southern California, such as the Imperial Valley. The Water Transfer Program would increase agricultural production, incomes, and employment opportunities associated with any transfer that uses the water for agricultural production outside of the Central Valley. The net change in jobs is expected to be minimal, with only minor effects on community stability.

8.2.4.5 Comparison of Program Elements to Existing Conditions

The primary actions that differentiate existing conditions and No Action conditions are the CVPIA and Bay-Delta Accord. These actions are currently being implemented and results forecasted. Therefore, the conclusions regarding the magnitude and significance of impacts would be the same if they are compared to existing conditions as compared to the No Action Alternative.

8.2.4.6 Mitigation Strategies

The major impact to social well-being would the loss of jobs. The following mitigation measures would minimize the intensity of the impact on social well-being.

Minimize job loss to the extent possible by relocating facilities and shifting agriculture to new areas.

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Provide training and educational opportunities for unemployed individuals to reenter the workforce.

Mitigation strategies to reduce potential water transfer impacts for agriculture sector employees are: minimize or avoid fallowing or shifting crops that require high input and output expenditures; limit the amount of acreage that can be fallowed in a given area; promote conjunctive use of surface and groundwater resources to encourage maintenance of agricultural production in selling regions without adversely impacting groundwater resources; minimize the amount of water conservation that individual water transferors in a given region can incorporate; limit the proximity and/or capacity of wells that can be used to develop water either for a direct groundwater transfer or groundwater substitution transfer; and operate a groundwater level monitoring program to determine whether pumping should be shifted, terminated, or reduced in any of the transferring pumps. Mitigation measures for recreation sector employees are: configure transfers to minimize effects on reservoir recreation; and ensure that all existing minimum instream flow requirements on affected rivers and reservoir minimum pools on affected reservoirs are met. Mitigation measures for both agricultural and recreation sector employees are: provide job referral and placement services and job retraining; compensate local governments for increased demand for services resulting from labor displacement; compensate workers displaced by specific transfers through such actions as augmenting unemployment insurance benefits; and promote geographically broad-based water transfers and ensure that no one localized area is involved in a disproportionately large amount of transfer activity. The potential consequence of these measures is to decrease the amount of water that can be transferred.

Additional mitigation strategies include: 1) limit the proximity and/or capacity of wells that can be used to develop water either for a direct groundwater transfer or groundwater substitution transfer; 2) operate a groundwater level monitoring program to determine whether pumping should be shifted, terminated, or reduced in any of the transferring pumps; 3) promote conjunctive use of surface and groundwater resources, which would encourage maintenance of agricultural production in selling regions without adversely impacting groundwater resources; and 4) promote geographically broad-based water transfers that ensure that no one area is involved in a disproportionately large amount of transfer activity.

8.2.4.7 Potentially Significant Unavoidable Impacts

Farm worker job loss may result in adverse unavoidable impacts. In some cases jobs may be shifted to other areas; however, jobs also may be eliminated with no replacement. This would represent a significant unavoidable impact of the CALFED program.

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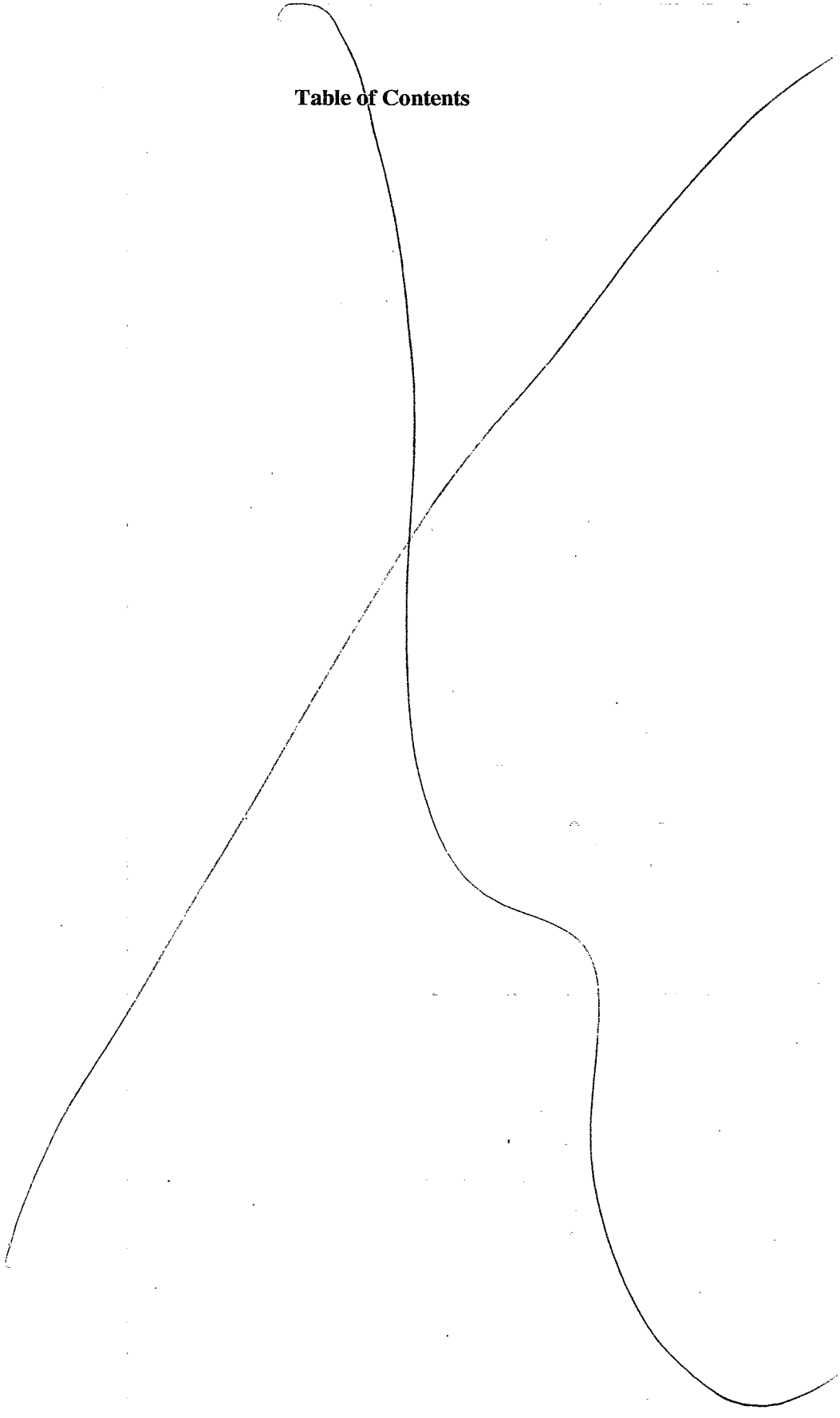

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	Delta	Bay	San Joaquin	Sacramento	CVP and SWP Service Areas Outside the Central Valley
1996 Population[a]	2,362,514	5,498,964	3,004,222	1,666,650	19,159,450
Economic Indicators					
Median Family Income (1989)[b]	40,690	46,373	30,862	31,794	38,825
Per Capita Income[c] (1994)	21,991	28,079	16,475	18,313	20, 358
Poverty Rate[d]	11%	9%	18%	13%	13%
1995 Unemployment Rate[e] Average Range	 7.8% 5.8 to 12.3%	 6.6% 4.3 to 13.5%	 13.3% 8.2 to 16.9%	 11.2% 6.1 to 19.7%	 10% 5.1 to 28.8%

NOTES:
[a] Source: California Department of Finance, County Population Data, aggregated into CALFED Regions according to Table 1.
[b] Source: California Department of Finance, Median Family Income for each county was averaged to show average median family income for each CALFED region.
[c] Source: California Department of Finance, Per Capital Income for each county was averaged to show average per capita income for each CALFED region.
[d] Poverty Rate
[e] Source: California Department of Finance; Average of counties within each CALFED Region

Table 8.2.1-2 Existing Conditions: Regional Demographics and Economic Indicators of Social Well Being

C-116456

	In Total Dissolved Solids (TDS, in ppm)											
	No Action, 1A, 1B			Alternative 1C			Alternative 2B			Alternative 2D		
Selected Locations	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High
Middle Delta	109	139	207	112	148	206	106	123	137	106	124	141
Delta Export Pumps	217	278	366	185	235	356	175	193	216	163	191	215
South Delta	282	331	389	226	320	395	221	318	395	247	326	395
	Alternative 2E			Alternative 3A			Alternative 3B			Alternative 3D, 3E, 3H, 3I		
Selected Locations	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High
Middle Delta	104	121	135	132	185	254	134	186	254	179	240	270
Delta Export Pumps	164	190	214	112	149	185	112	143	176	100	127	177
South Delta	248	326	395	310	373	448	328	378	448	301	346	395
	In Electrical Conductivity (ED, in mmho/cm)											
	No Action, 1A, 1B			Alternative 1C			Alternative 2B			Alternative 2D		
Selected Locations	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High
Middle Delta	0.17	0.22	0.32	0.18	0.23	0.32	0.17	0.19	0.21	0.17	0.19	0.22
Delta Export Pumps	0.34	0.43	0.57	0.29	0.37	0.56	0.27	0.30	0.34	0.25	0.30	0.34
South Delta	0.44	0.52	0.61	0.35	0.50	0.62	0.35	0.50	0.62	0.39	0.51	0.62
	Alternative 2E			Alternative 3A			Alternative 3B			Alternative 3D, 3E, 3H, 3I		
Selected Locations	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High
Middle Delta	0.16	0.19	0.21	0.21	0.29	0.40	0.21	0.29	0.40	0.28	0.37	0.42
Delta Export Pumps	0.26	0.30	0.33	0.18	0.23	0.29	0.18	0.22	0.28	0.16	0.20	0.28
South Delta	0.39	0.51	0.62	0.48	0.58	0.70	0.51	0.59	0.70	0.47	0.54	0.62

NOTES:
1. EC = TDS/640 is used to convert TDS to EC.
2. Data for Alternatives 2A are not available.
3. Middle Delta location is Prisoner's Point; South Delta location is Old River at Middle River. Tracy Pumping Plant is export location.
SOURCE: Status Reports on Technical Studies for the CALFED Alternatives, DWR, 1997.

Table 8.2.3-2 Estimated Salinity of Irrigation Water in Selected Locations, by Alternative (During Irrigation Season: April to Sept.)